

REMARKS/ARGUMENTS

Reconsideration of this application in light of the Office Action having a mailing date of October 21, 2005 is requested. Original Claims 1-35 have been cancelled and new Claims 36-40 have been added. Support for the new claims is found in the original claims and Applicants' examples at pages 12-17.

Summary of Applicants' Invention as Set Forth In Independent Claim 36

The gist of Applicants' invention as described in independent Claim 36 and dependant Claims 37-40 resides in the disclosure of Examples 1-8 in Applicants' specification (pages 12-17). In one aspect of the invention as set forth in Claim 36, it was found per Example 1 (page 13) in the removal of oxygen from a hydride gas that manganese oxide (MnO) impregnated on carbon results in a substantially higher O₂ loading than when unsupported MnO is used as the reduced metal oxide (Example 2, paragraph [0045]). In a second aspect of the invention as set forth in Claim 36, Example 3 shows that MnO impregnated on alumina is more effective than the unsupported MnO as in Example 2, but less effective than the catalyst of Example 1. However, not only did the activated alumina provide for a better catalyst, it also served as a desiccant allowing for the removal of water generated in the oxygen removal process (Example 4, paragraph [0049]).

Rejection of Claims 14-18 under 35 U.S.C. §112 2nd paragraph

Claims 14-18 were rejected under this statute on the basis there was no antecedent basis for "the impregnated porous support". In view of the cancellation of these claims, the rejection becomes moot.

Rejection of Claims 1-13, 19-25 and 30-35 35 U.S.C. §103(a) Over Golden, et al . et al US 5,536,302 in view of Otsuka, et al 2002/034467

In paragraph 4 of the Office Action the Examiner cited Golden, et al as showing the use of an adsorbent comprised of a reduced metal oxide on a porous support (carbon) for removal of impurities from a hydride stream. The difference between the then claimed invention and Golden, et al resided in the incorporation of a desiccant. Otsuka, et al was cited as showing the use of reduced metal oxide, i.e., MnO in combination with a desiccant in the purification of a hydride gas. The Examiner concluded that it would have been obvious to combine Otsuka, et al with Golden et al under 35 U.S.C. §103(a), utilizing the showing of Otsuka, et al's use of a desiccant to remove water present in the product of Golden, et al.

Response to the Rejection of Claims 1-13, 19-25 and 30-35 35 U.S.C. §103(a) Golden, et al . et al US 5,536,302 in view of Otsuka, et al 2002/034467

Claims 36-40 differ from the original claims in that they focus on two aspects of the invention as shown in the examples, i.e., the use of MnO on two types of supports and the use of alkali and alkaline earth metal oxides on activated alumina for the removal of oxygen from hydride gases. Although Golden, et al teach the use of alkaline and alkaline earth metal oxides on carbon, coal, carbon black, petroleum coke, and titania as a support for removing oxygen from inert gases such as a hydride gas, there is neither a teaching of the use of transition metal such as manganese oxide nor is there any teaching of the use of activated alumina as a support nor a motivation to do so.

In terms of Claim 36 Otsuka, et al, disclose the use of unsupported manganese oxide as a means for removing oxygen from ammonia followed by passage of the oxygen free gas though a desiccant, i.e., a zeolite to remove residual water. There is no showing of incorporating MnO on a support and particularly there is no showing of the claimed supports, carbon and activated alumina.

The question under 35 U.S.C. §103(a) then is whether there is sufficient teaching in Golden, et al and Otsuka, et al to establish a *prima facie* case of obviousness of the claimed subject matter. The second question, assuming a *prima facie* case, under 35 U.S.C. §103(a), is whether Applicants' have provided evidence which would rebut that *prima facie* case. Clearly, neither Golden, et al or Otsuka, et al alone or in combination provide sufficient teaching to establish one skilled in the art with the invention as set forth in Claim 36.

To facilitate prosecution, though, Applicants' will approach the rejection under 35 U.S.C. §103(a) that a *prima facie* case of obviousness has been made which then reduces the issue as to whether that *prima facie* case has been rebutted.

Rebuttal of Prima Facie case of Obviousness

In terms of rebuttal evidence pertaining to an alleged *prima facie* case of obviousness of the catalyst set forth in Claim 36 relating to MnO impregnated on carbon, reference is made to the results in Examples 1 and 2. In the removal of O₂ from a hydride gas the examples show that impregnating MnO on a carbon substantially increases the O₂ loading vis-à-vis unsupported MnO. Golden, et al offer no suggestion of the use of MnO as a catalyst for their carbon support and they offer no suggestion that impregnating MnO on carbon would offer unexpected results in term increased O₂ loading when removing O₂ from a hydride gas.

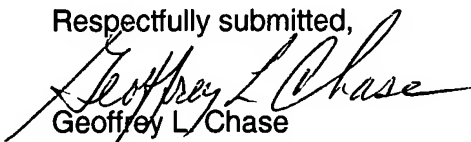
Example 3 shows that when MnO is impregnated into activated alumina and the resultant catalyst employed in the removal of O₂ from a hydride gas the O₂ loading is less than when the MnO is supported on carbon, but the O₂ loading is significantly greater than the O₂ loading than on unsupported MnO as taught by Otsuka, et al. In addition, water generated in the removal process is removed showing that the combination of MnO impregnated on activated alumina functions as a catalyst as well as a desiccant (page 14,

paragraph [0047]). Based upon the results of Example 3 the inventors believe it is reasonable to assume that alkali metals, as exemplified by cesium, would function as a catalyst and as a desiccant, too. This finding is surprising and unexpected in light of the teachings set forth in the references cited by the Examiner.

In paragraph 5 of the Office Action the Examiner cited Liu, et al US 4,795,735 as showing the combination of activated carbon (adsorbent) and alumina (desiccant) and that it would have been obvious to combine the composite with the adsorbent of modified Golden, et al ('302). Liu, et al disclose the use of their adsorbent to remove organics (phenol) using the carbon portion of their composite and potassium dichromate using the activated alumina portion of the composite. There is nothing in Liu, et al that suggests combining the composite with a catalyst and there is nothing in Golden, et al to suggest combining the alkali and alkaline earth metal oxides of Golden, et al or the MnO of Otsuka, et al to make the active catalyst now claimed and pending in the application. Further, there is no disclosure in Liu, et al that provides the motivation for making the combination suggested by the Examiner and the Examiner has not cited any relevant disclosure addressing the problem and thus a solution to Applicants' problem. Absent the necessary disclosure to provide the motivation to make the combination with Golden, et al or with Otsuka, et al, a rejection under 35 U.S.C. §103(a) cannot be maintained.

In view of the foregoing amendments and arguments it is requested the claims be allowed and the application passed to issue. A *prima facie* case of obviousness has not been made, and as the arguments and data show, any *prima facie* case of obviousness has been rebutted.

Respectfully submitted,

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